CLAIMS:

1   1.   A method for reliably transmitting a frame comprising the steps of:

2   inserting two or more sequence numbers in said frame, wherein each of said

3   two or more sequence numbers is associated with a destination node; and

4   transmitting said frame to two or more destination nodes.

1   2.   The method as recited in claim 1 further comprising the step of:

2   inserting one or more bits in a frame header of said frame to select appropriate

3   ports in a switch fabric to transmit said frame.

1   3.   The method as recited in claim 2 further comprising the step of:

2   setting a bit in said frame header of said frame to indicate an explicit or an

3   implicit acknowledgment.

1   4.   The method as recited in claim 1 further comprising the step of:

2   saving a copy of said transmitted frame.

1   5.   The method as recited in claim 1 further comprising the step of:

2   receiving an acknowledgment from a particular destination node of said two

3   or more destination nodes.

1   6.   The method as recited in claim 5 further comprising the steps of:

2   identifying said particular destination node;

3   identifying a frame associated with said acknowledgment;

4   reading a data structure associated with said particular destination node; and

5   determining if a sequence number associated with said acknowledgment is

6   greater than an expected sequence number.

1   7.   The method as recited in claim 6, wherein if said sequence number associated

2   with said acknowledgment is greater than said expected sequence number then the

3   method further comprises the step of:

4   detecting a lost acknowledgment.

1   8.   The method as recited in claim 5 further comprising the steps of:

2   identifying said particular destination node;

3   identifying a frame associated with said acknowledgment;

4   reading a data structure associated with said particular destination node;

5   indicating in an entry in said data structure associated with said particular

6   destination node that a frame associated with said acknowledgment from said

7   particular destination node has been received; and

8   identifying a previous entry associated with a frame transmitted with an

9   implicit acknowledgment in said data structure associated with said particular

10   destination node as having been received.

1   9.   The method as recited in claim 5 further comprising the steps of:

2   identifying said particular destination node;

3   identifying a frame associated with said acknowledgment;

4   reading a data structure associated with said frame associated with said

5   acknowledgment; and

6   indicating in an entry in said data structure associated with said particular

7   destination node that a frame associated with said acknowledgment from said

8   particular destination node has been received.

1   10.   The method as recited in claim 9 further comprising the step of:

2   determining if there are outstanding responses for said frame associated with

3   said acknowledgment.

1   11.   The method as recited in claim 10, wherein if there are outstanding responses

2   for said frame associated with said acknowledgment then the method further

3   comprises the step of:

4   waiting to receive an additional acknowledgment.

1   12.   The method as recited in claim 10, wherein if there are no outstanding

2   responses for said frame then the method further comprises the step of:

3   releasing memory associated with said frame associated with said

4   acknowledgment.

1   13.   The method as recited in claim 1 further comprising the step of:

2   receiving a request to retransmit said frame from a particular destination node

3   of said two or more destination nodes; and

4   retransmitting said frame to said particular destination node of said two or

5   more destination nodes.

1   14.   The method as recited in claim 1, wherein said frame is a multicast frame.

1   15.   A computer program product embodied in a machine readable medium for

2   reliably transmitting a frame, comprising:

3   programming operable for inserting two or more sequence numbers in said

4   frame, wherein each of said two or more sequence numbers is associated with a

5   destination node; and

6   programming operable for transmitting said frame to two or more destination

7   nodes.

1   16.   The computer program product as recited in claim 15 further comprises:

2   programming operable for inserting one or more bits in a frame header of said

3   frame to select appropriate ports in a switch fabric to transmit said frame.

1   17.   The computer program product as recited in claim 16 further comprises:

2   programming operable for setting a bit in said frame header of said frame to

3   indicate an explicit or an implicit acknowledgment.

1   18.   The computer program product as recited in claim 15 further comprises:

2   programming operable for saving a copy of said transmitted frame.

1   19.   The computer program product as recited in claim 15 further comprises:

2   programming operable for receiving an acknowledgment from a particular

3   destination node of said two or more destination nodes.

1   20.   The computer program product as recited in claim 19 further comprises:

2   programming operable for identifying said particular destination node;

3   programming operable for identifying a frame associated with said

4   acknowledgment;

5   programming operable for reading a data structure associated with said

6   particular destination node; and

7   programming operable for determining if a sequence number associated with

8   said acknowledgment is greater than an expected sequence number.

1   21.   The computer program product as recited in claim 20, wherein if said

2   sequence number associated with said acknowledgment is greater than said expected

3   sequence number then the computer program product further comprises:

4   programming operable for detecting a lost acknowledgment.

1   22.   The computer program product as recited in claim 19 further comprises:

2   programming operable for identifying a frame associated with said

3   acknowledgment;

4   programming operable for reading a data structure associated with said

5   particular destination node;

6   programming operable for indicating in an entry in said data structure

7   associated with said particular destination node that a frame associated with said

8   acknowledgment from said particular destination node has been received; and

9   programming operable for identifying a previous entry associated with a

10   frame transmitted with an implicit acknowledgment in said data structure associated

11   with said particular destination node as having been received.

1   23.   The computer program product as recited in claim 19 further comprises:

2   programming operable for identifying said particular destination node;

3   programming operable for identifying a frame associated with said

4   acknowledgment;

5   programming operable for reading a data structure associated with said frame

6   associated with said acknowledgment; and

7   programming operable for indicating in an entry in said data structure

8   associated with said particular destination node that a frame associated with said

9   acknowledgment from said particular destination node has been received.

1   24.   The computer program product as recited in claim 23 further comprises:

2   programming operable for determining if there are outstanding responses for

3   said frame associated with said acknowledgment.

1   25.   The computer program product as recited in claim 24, wherein if there are

2   outstanding responses for said frame associated with said acknowledgment then the

3   computer program product further comprises:

4   programming operable for waiting to receive an additional acknowledgment.

1   26.   The computer program product as recited in claim 24, wherein if there are no

2   outstanding responses for said frame then the computer program product further

3   comprises:

4   programming operable for releasing memory associated with said frame

5   associated with said acknowledgment.

1   27.   The computer program product as recited in claim 15 further comprises:

2   programming operable for receiving a request to retransmit said frame from a

3   particular destination node of said two or more destination nodes; and

4   programming operable for retransmitting said frame to said particular

5   destination node of said two or more destination nodes.

1   28.   The computer program product as recited in claim 15, wherein said frame is a

2   multicast frame.

1   29.   A node, comprising:

2   a processor; and

3   a memory unit coupled to said processor, wherein said memory unit is

4 operable for storing a computer program operable for reliably transmitting a frame,

5 wherein the computer program is operable for performing the following programming

6 steps:

7   inserting two or more sequence numbers in said frame, wherein each

8 of said two or more sequence numbers is associated with a destination node; and

9   transmitting said frame to two or more destination nodes.

1   30.   The node as recited in claim 29, wherein the computer program is further

2 operable for performing the following programming step:

3   inserting one or more bits in a frame header of said frame to select appropriate

4 ports in a switch fabric to transmit said frame.

1   31.   The node as recited in claim 30, wherein the computer program is further

2 operable for performing the following programming step:

3   setting a bit in said frame header of said frame to indicate an explicit or an

4 implicit acknowledgment.

1   32.   The node as recited in claim 29, wherein the computer program is further

2 operable for performing the following programming step:

3   saving a copy of said transmitted frame.

1   33.   The node as recited in claim 29, wherein the computer program is further

2 operable for performing the following programming step:

3   receiving an acknowledgment from a particular destination node of said two

4 or more destination nodes.

1   34.   The node as recited in claim 33, wherein the computer program is further

2   operable for performing the following programming steps:

3   identifying said particular destination node;

4   identifying a frame associated with said acknowledgment;

5   reading a data structure associated with said particular destination node; and

6   determining if a sequence number associated with said acknowledgment is

7   greater than an expected sequence number.

1   35.   The node as recited in claim 34, wherein if said sequence number associated

2   with said acknowledgment is greater than said expected sequence number then the

3   computer program is further operable for performing the following programming

4   step:

5   detecting a lost acknowledgment.

1   36.   The node as recited in claim 33, wherein the computer program is further

2   operable for performing the following programming steps:

3   identifying said particular destination node;

4   identifying a frame associated with said acknowledgment;

5   reading a data structure associated with said particular destination node;

6   indicating in an entry in said data structure associated with said particular

7   destination node that a frame associated with said acknowledgment from said

8   particular destination node has been received; and

9   identifying a previous entry associated with a frame transmitted with an

10 implicit acknowledgment in said data structure associated with said particular

11 destination node as having been received.

1   37.   The node as recited in claim 33, wherein the computer program is further

2   operable for performing the following programming steps:

3   identifying said particular destination node;

4   identifying a frame associated with said acknowledgment;

5   reading a data structure associated with said frame associated with said

6   acknowledgment; and

7   indicating in an entry in said data structure associated with said particular

8   destination node that a frame associated with said acknowledgment from said

9   particular destination node has been received.

1   38.   The node as recited in claim 37, wherein the computer program is further

2   operable for performing the following programming step:

3   determining if there are outstanding responses for said frame associated with

4   said acknowledgment.

1   39.   The node as recited in claim 38, wherein if there are outstanding responses for

2   said frame associated with said acknowledgment then the computer program is

3   further operable for performing the following programming step:

4   waiting to receive an additional acknowledgment.

1   40.   The node as recited in claim 38, wherein if there are no outstanding responses

2   for said frame then the computer program is further operable for performing the

3   following programming step:

4   releasing memory associated with said frame associated with said

5   acknowledgment.

1   41.   The node as recited in claim 29, wherein the computer program is further

2   operable for performing the following programming steps:

3   receiving a request to retransmit said frame from a particular destination node

4   of said two or more destination nodes; and

5   retransmitting said frame to said particular destination node of said two or

6   more destination nodes.

1   42.   The node as recited in claim 29, wherein said frame is a multicast frame.

1   43.   A system, comprising:

2   a transmitting node configured to transmit one or more frames of data;

3   a switch fabric coupled to said transmitting node configured to direct said

4   transmitted one or more frames of data;

5   a plurality of destination nodes coupled to said switch fabric, wherein each of

6   said plurality of destination nodes is configured to receive one or more of said one or

7   more frames of data; and

8   wherein said transmitting node comprises:

9   a processor; and

10   a memory unit coupled to said processor, wherein said memory unit is

11   operable for storing a computer program operable for reliably transmitting one or

12   more frames of data, wherein the computer program is operable for performing the

13   following programming steps:

14   inserting two or more sequence numbers in a frame of data,

15   wherein each of said two or more sequence numbers is associated with one of said

16   plurality of destination nodes; and

17   transmitting said frame of data to two or more of said plurality

18   of destination nodes.

1   44.   The system as recited in claim 43, wherein the computer program is further

2   operable for performing the following programming step:

3   inserting one or more bits in a frame header of said frame of data to select

4   appropriate ports in said switch fabric to transmit said frame of data.

1   45.   The system as recited in claim 44, wherein the computer program is further

2   operable for performing the following programming step:

3   setting a bit in said frame header of said frame of data to indicate an explicit

4   or an implicit acknowledgment.

1   46.   The system as recited in claim 43, wherein the computer program is further

2   operable for performing the following programming step:

3   saving a copy of said transmitted frame of data.

1   47.   The system as recited in claim 43, wherein the computer program is further

2   operable for performing the following programming step:

3   receiving an acknowledgment from a particular destination node of said two

4   or more destination nodes.

1   48.   The system as recited in claim 47, wherein the computer program is further

2   operable for performing the following programming steps:

3   identifying said particular destination node;

4   identifying a frame of data associated with said acknowledgment;

5   reading a data structure associated with said particular destination node; and

6   determining if a sequence number associated with said acknowledgment is

7   greater than an expected sequence number.

1   49.   The system as recited in claim 48, wherein if said sequence number associated

2   with said acknowledgment is greater than said expected sequence number then the

3   computer program is further operable for performing the following programming

4   step:

5   detecting a lost acknowledgment.

1   50.   The system as recited in claim 47, wherein the computer program is further

2   operable for performing the following programming steps:

3   identifying said particular destination node;

4   identifying a frame associated with said acknowledgment;

5   reading a data structure associated with said particular destination node;

6   indicating in an entry in said data structure associated with said particular

7   destination node that a frame associated with said acknowledgment from said

8   particular destination node has been received; and

9   identifying a previous entry associated with a frame transmitted with an

10   implicit acknowledgment in said data structure associated with said particular

11   destination node as having been received.

1   51.   The system as recited in claim 47, wherein the computer program is further

2   operable for performing the following programming steps:

3   identifying said particular destination node;

4   identifying a frame of data associated with said acknowledgment;

5   reading a data structure associated with said frame of data associated with said

6   acknowledgment; and

7   indicating in an entry in said data structure associated with said particular

8   destination node that a frame associated with said acknowledgment from said

9   particular destination node has been received.

1   52.   The system as recited in claim 51, wherein the computer program is further

2   operable for performing the following programming step:

3   determining if there are outstanding responses for said frame of data

4   associated with said acknowledgment.

1   53.   The system as recited in claim 52, wherein if there are outstanding responses

2   for said frame associated with said acknowledgment then the computer program is

3   further operable for performing the following programming step:

4   waiting to receive an additional acknowledgment.

1   54.   The system as recited in claim 52, wherein if there are no outstanding

2   responses for said frame then the computer program is further operable for

3   performing the following programming step:

4   releasing memory associated with said frame of data associated with said

5   acknowledgment.